Supporting Information:

Microbial Community Synergy Drives Metal-Dependent Anaerobic Methane Oxidation Under Simulated Deep-Sea High-Pressure Conditions

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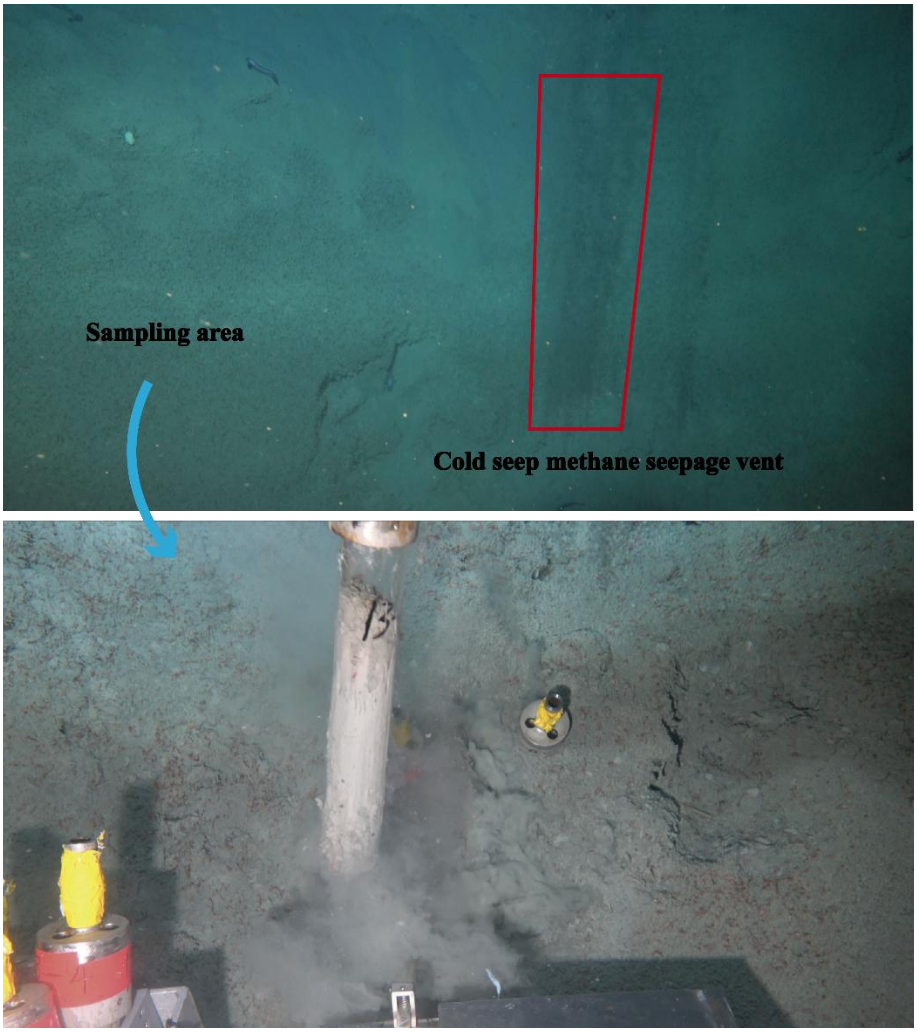
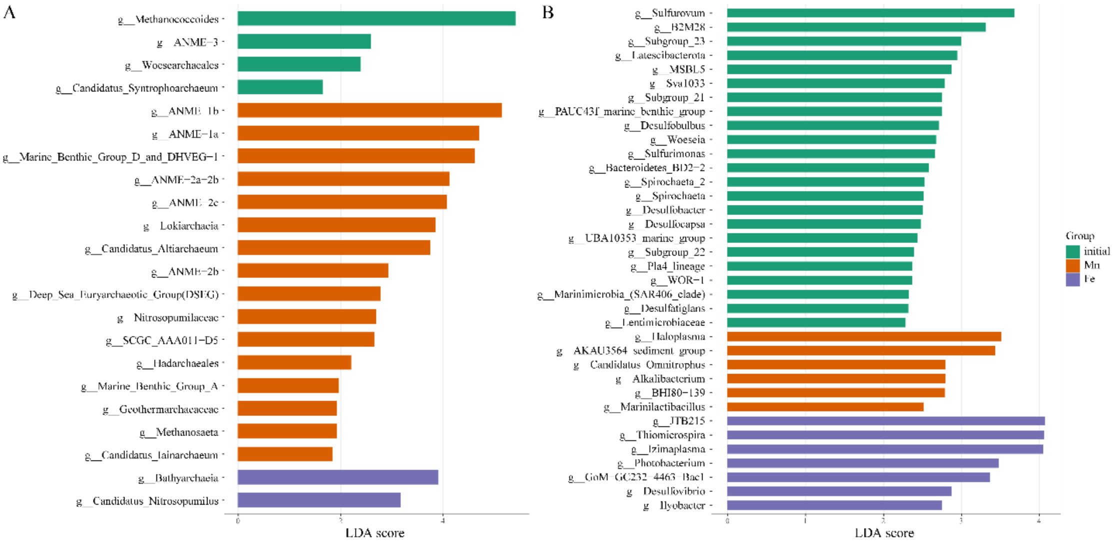
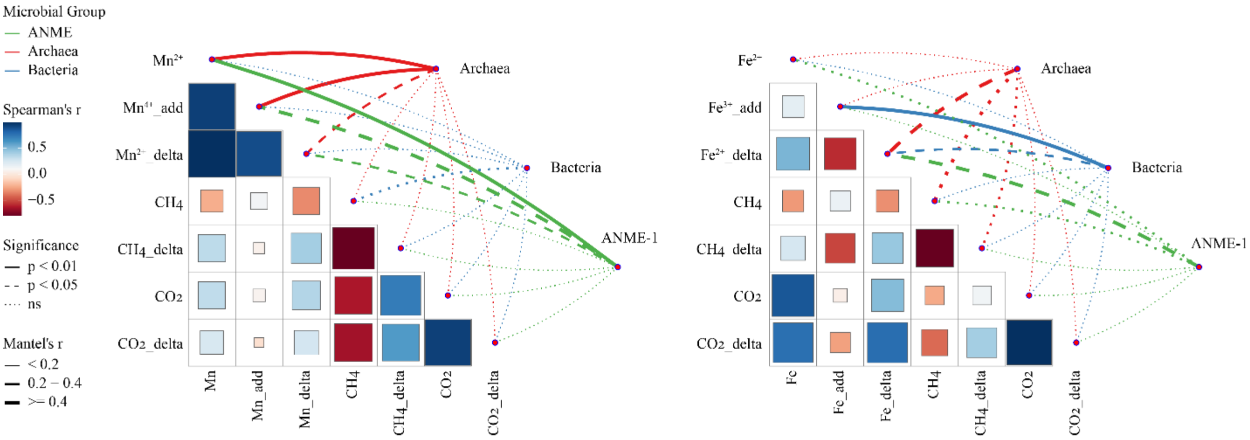
Supplementary Figures



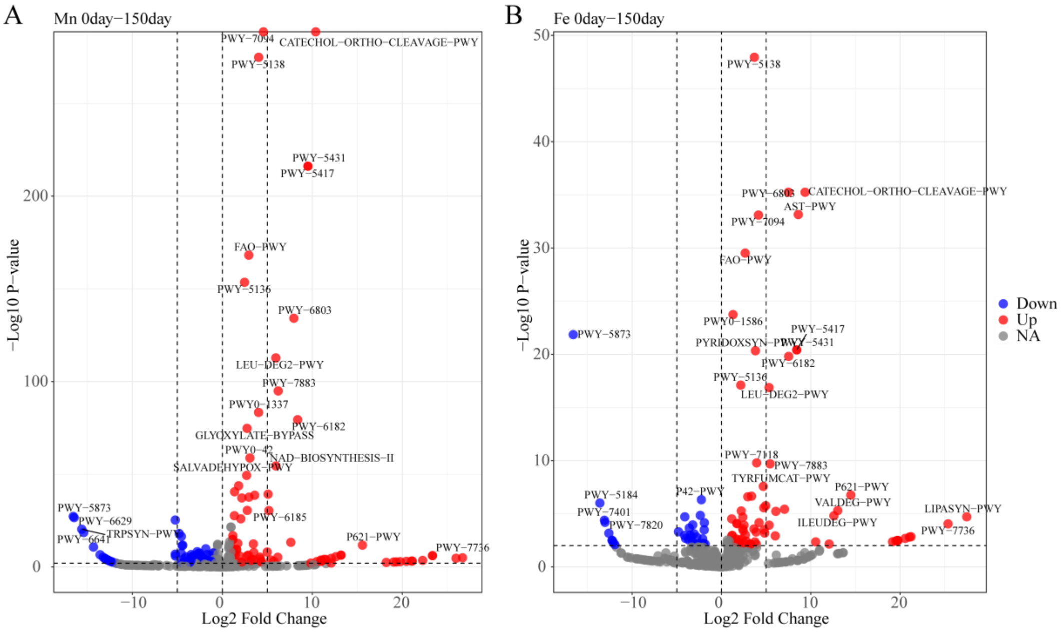
Supplementary Figure 1: A, In situ environment of the Haima cold seep vent. B, Underwater Remotely Operated Vehicle (ROV) collecting sediment samples.



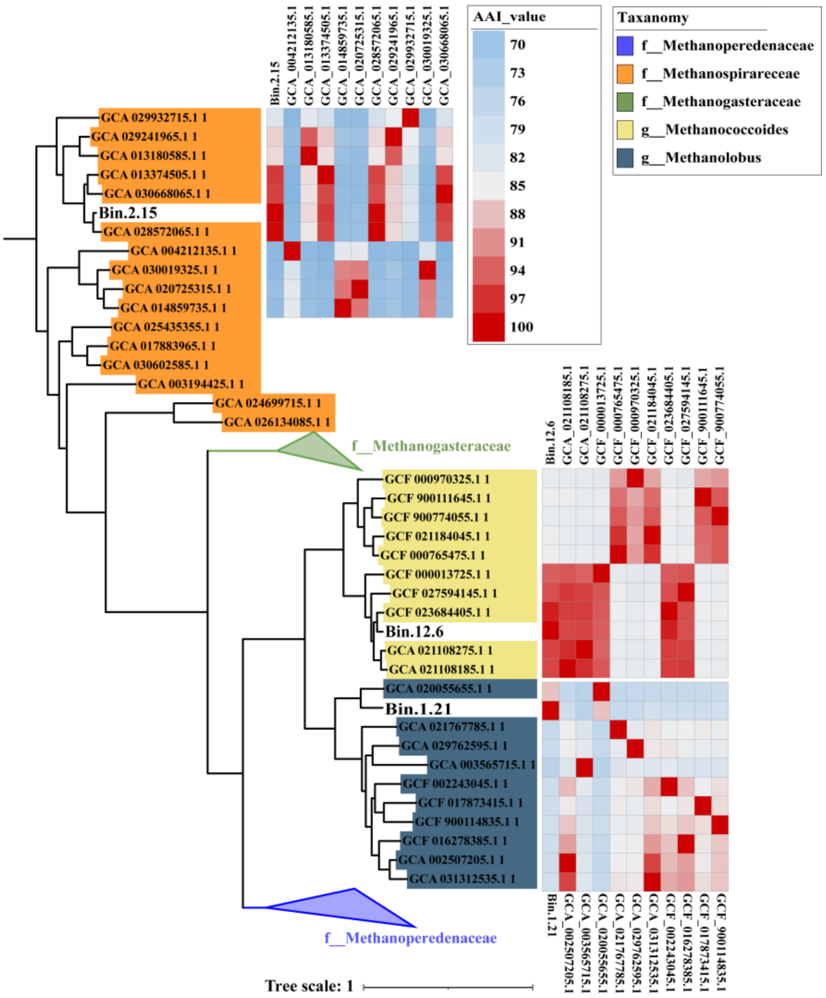
Supplementary Figure 2: Differences in microbial genus levels under different cultivation conditions.



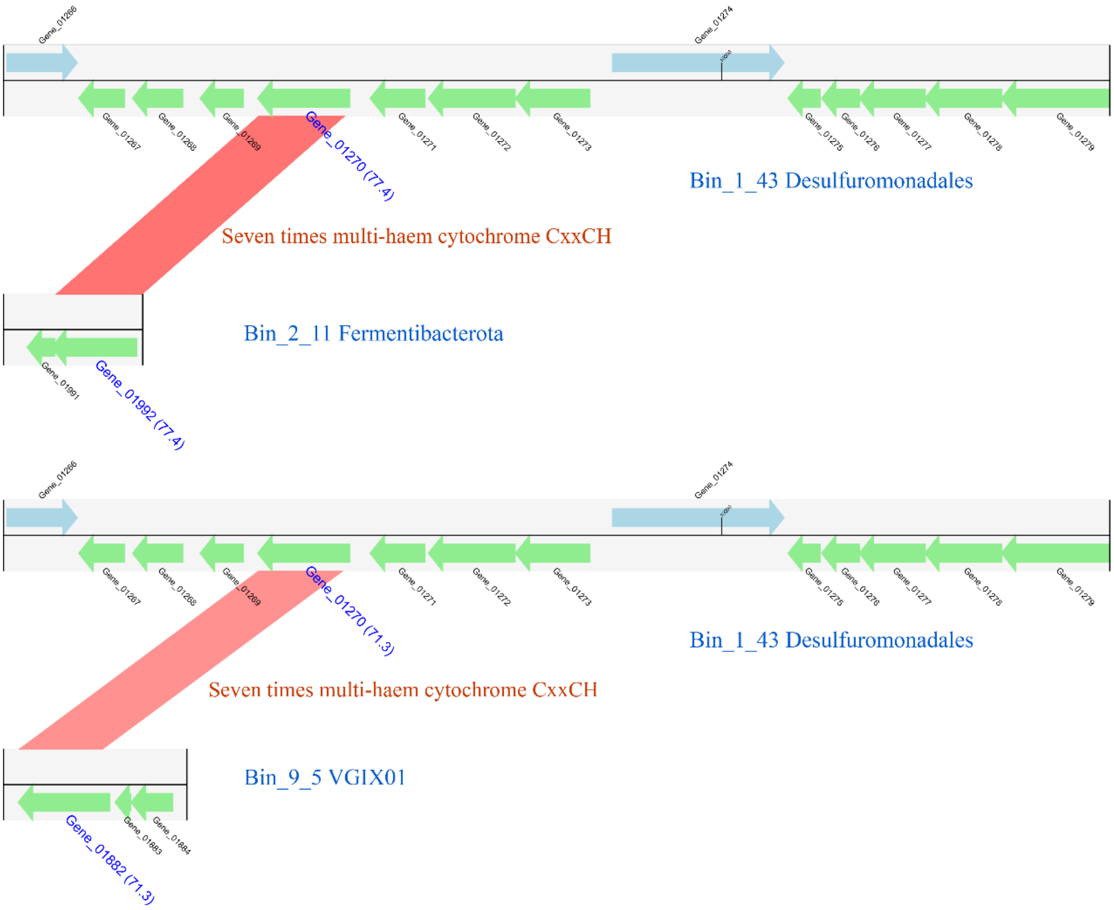
Supplementary Figure 3: Correlation (mantel test) between the microbial community and physicochemical parameters in the enrichment system, including concentrations of iron, manganese, methane, carbon dioxide, and their respective changes over time.



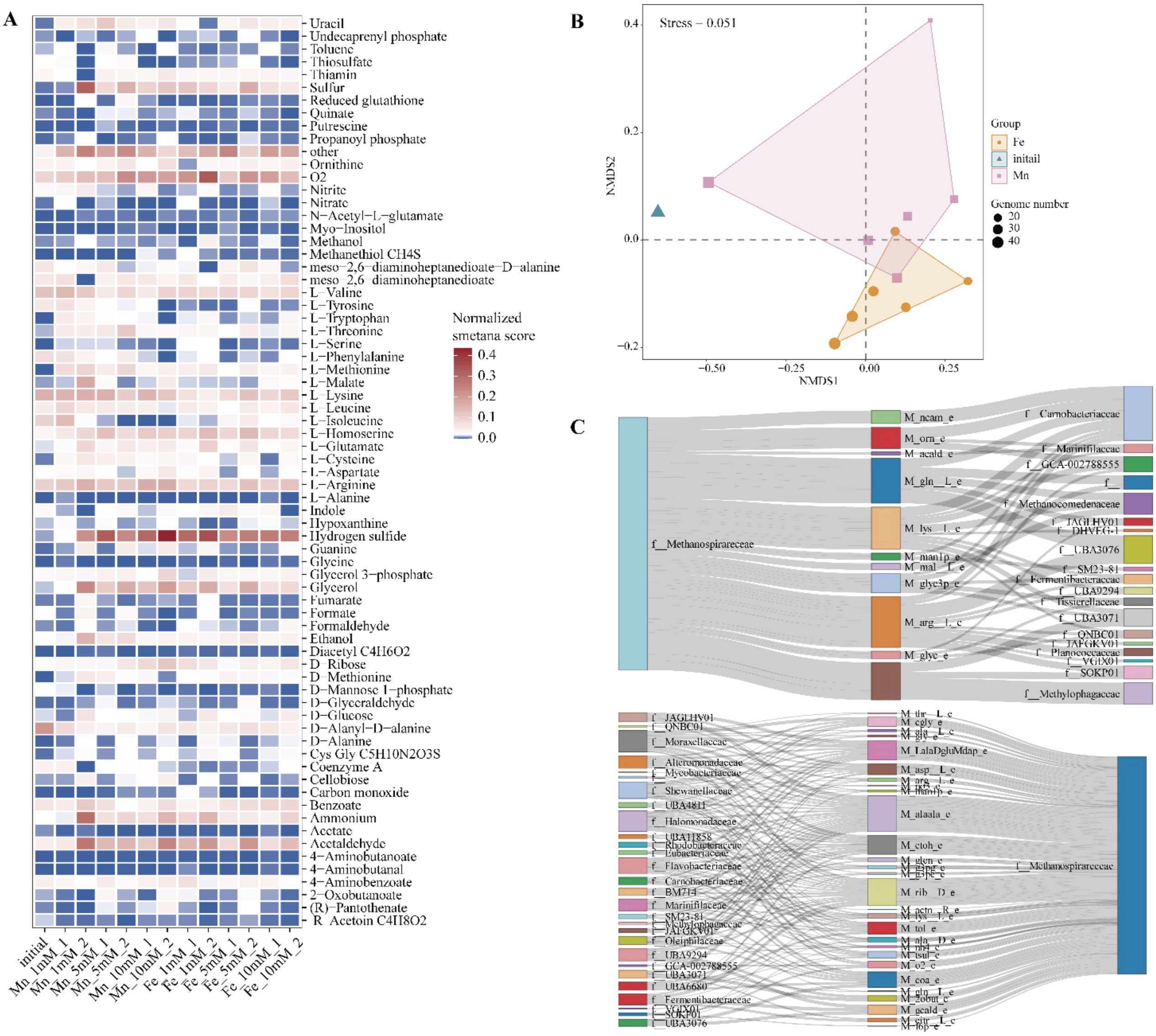
Supplementary Figure 4: Differences in the microbial metabolic pathway abundances before and after enrichment. A. Enrichment experiment with birnessite addition. B. Enrichment experiment with ferrihydrite addition.



Supplementary Figure 5: Phylogenetic tree of anaerobic methanotrophic bacteria and a heatmap representing the average amino acid similarity between the genomes.



Supplementary Figure 6: Synteny plots of multi heme cytochrome (MHC) genes across different genomes. The genes encoded on the forward strand are shown in light blue, and the genes encoded on the reverse strand are shown in light green. The genes predicted to be involved in HGT are highlighted in blue, with the pairwise identifiers provided in large font within the parentheses. The red bars indicate the similarity of the matching regions between contigs based on the BLASTN results.



Supplementary Figure 7: Cross-feeding interactions predicted based on MAGs. A. Normalized SMETANA values of the metabolites predicted by cross feeding in different samples. B. The non-metric multidimensional scaling (NMDS) analysis revealed differences in the predicted metabolites of the cross-feeding among the samples. C. Exchange of metabolites between the ANME-1 group and other groups, acting as both donors and recipients.